REMARKS

This application has been reviewed in light of the final Office Action dated November 16, 2006. In view of the foregoing amendments and the following remarks, favorable reconsideration and withdrawal of the rejections set forth in the Office Action are respectfully requested.

Claims 2-7 are pending. Claim 2 has been amended. Support for the claim changes can be found in the original disclosure, and therefore no new matter has been added. Claim 2 is the sole independent claim.

Claim 2 was rejected under 35 U.S.C. § 112, second paragraph, as being indefinite. Without conceding the propriety of this rejection, Claim 2 has been amended. In this regard, Applicants understand that the amendment to Claim 2 suggested in the Office Action is neither clear nor correct. First, Applicants note that there is no antecedent basis in Claim 2 for the suggested language "the opposite side." Second, the suggested amendment appears to state that the opening is formed in the side of the substrate having the energy generating element, while according to the claimed invention the opening is formed in the side not having the energy generating element, i.e., the opening is formed in the side opposite to the side having the energy generating element. In view of the amendments to Claim 2 and the foregoing remarks, withdrawal of this rejection is respectfully requested.

Claims 2-6 were rejected under 35 U.S.C. § 103(a) as being unpatentable over U.S. Patent No. 6,126,271 (*Terui*) in view of U.S. Patent No. 6,245,245 (*Sato*).

Claim 7 was rejected under 35 U.S.C. § 103(a) as being unpatentable over *Terui* in view of *Sato* and further in view of the article "Abrasive Wear Performance of Various Poly Amides" (*Rajesh et al.*).

Without conceding the propriety of the rejections over the prior art, independent Claim 2 has been amended. Applicants submit that amended independent Claim 2 is allowable over the cited art, for at least the reasons set forth below.

Independent Claim 2 relates to a method of manufacturing a substrate for an ink jet recording head, the substrate having a supply port, penetrating the substrate, for supplying liquid and an energy generating element for generating energy for ejecting the liquid. The method includes a step of forming a protecting film on a surface of the substrate which is opposite from a surface on which the energy generating element is disposed, a step of etching a surface of the protecting film by liquid containing ammonium fluoride to make the protecting film a thin film having a thickness of not less than 100 nm and not more than 500 nm, a step of forming an etching-resistant film on the thus etched protecting film, a step of forming opening patterns in the protecting film and the etching-resistant film, a step of forming an opening as the supply port, in a side of the substrate opposite from a side thereof having the energy generating element, by etching the substrate through the opening patterns, a step of removing a projected end portion of the protecting film which is projected into the opening and which is produced in the opening forming step, and a step of removing the etching-resistant film after the projected end portion removing step.

Figs. 1A-1F illustrate an example of Applicants' claimed invention. As shown therein, a protecting film 103 is formed on a surface of substrate 101 which is

opposite from a surface on which an energy generating element 102 is disposed. A surface of the protecting film is etched by liquid containing ammonium fluoride to make the protecting film a thin film having a thickness of not less than 100 nm and not more than 500 nm. An etching-resistant film 104 is formed on the thus etched protecting film. Opening patterns are formed in the protecting film and the etching-resistant film (Fig. 1C). An opening as a supply port 106 is formed in a side of the substrate opposite from a side thereof having the energy generating element, by etching the substrate through the opening patterns. A projected end portion of the protecting film (shown in Fig. 1D), which is projected into the opening (supply port) and which is produced in the opening forming step, is removed (shown in Fig. 1E). After the projected end portion has been removed, the etching-resistant film is removed (shown in Fig. 1F).

As discussed with reference to Figs. 1A-1F, it is noted that two layers, protecting film 103 and etching-resistant film 104, are formed in the side of the substrate opposite that of the energy generating element. As recited in the last two clauses of Claim 2, (portions of) those two layers are removed in separate steps, one step following the other in time.

By virtue of the invention as claimed in Claim 2, a clean surface of the protecting film can be provided, thus improving the function of the etching resistant film. For example, deposited foreign matter on the protecting film can be removed, and the etching resistant film can be prevented from peeling off. In addition, during the etching operation for removing the projected end portion of the protecting film, the etching time does not need to be strictly controlled.

Applicants submit that the cited art does not teach or suggest at least a step of etching a surface of a protecting film by liquid containing ammonium fluoride to make the protecting film a thin film having a thickness of not less than 100 nm and not more than 500 nm, a step of removing a projected end portion of the protecting film which is projected into an opening (supply port) and which is produced in an opening forming step, and a step of removing an etching-resistant film after the projected end portion removing step, as recited in Claim 2.

Terui relates to a method for manufacturing a liquid jet recording head held in place by a vacuum using a single-point bonder with a particular tip construction and a head manufactured by this method. The Office Action cites generally Figs. 6A-6F of *Terui*. As illustrated in those figures and described in the accompanying portion of the specification of *Terui*, SiO_2 layers 102 are formed as the heat accumulation layer (sic) on the upper and lower (as shown in the figure) surfaces of silicon wafer 101. Discharge energy transducing devices 103 are formed on the surface of the upper SiO_2 layer 102. The SiO_2 layer 102 on the lower surface (at the location of the supply port to be formed) is removed using buffer hydrofluoric acid. A groove 109 for the ink supply opening is formed, using a resist pattern 108 formed on the lower SiO_2 layer 102. (Col. 1, line 48 - col. 2, line 12; Figs. 6A-6F.)

Even if, for the sake of argument, SiO_2 layer 102 were deemed to correspond to Applicants' recited protecting film, nothing in *Terui* would be understood to teach or suggest a step of etching a surface of a protecting film by liquid containing ammonium fluoride to make the protecting film a thin film having a thickness of not less than 100 nm and not more than 500 nm, as recited in Claim 2.

Further, even if, for the sake of argument, SiO_2 layer 102 were deemed to correspond to Applicants' recited protecting film and groove 109 were deemed to correspond to Applicants' recited opening (supply port), nothing in *Terui* would be understood to teach or suggest a step of removing a projected end portion of a protecting film which is projected into an opening (supply port) and which is produced in an opening forming step, as recited in Claim 2.

Still further, even if, for the sake of argument, SiO_2 layer 102 were deemed to correspond to Applicants' recited protecting film, groove 109 were deemed to correspond to Applicants' recited opening (supply port) and resist pattern 108 were deemed to correspond to Applicants' recited etching-resistant film, nothing in *Terui* would be understood to teach or suggest a step of removing an etching-resistant film after a projected end portion removing step (of removing a projected end portion of a protecting film which is projected into an opening (supply port) and which is produced in an opening forming step), as recited in Claim 2.

Sato relates to a method for manufacturing an ink jet head. The Office Action cites generally the discussion of Figs. 1A-1G in column 5 of *Sato*. As illustrated therein and described thereat, a membrane 2 is formed as an anisotropic etching stop layer on the upper (as shown in the figures) surface of substrate 1. A membrane 3 for the formation of heat generating elements is formed on membrane 2. A silicon oxide membrane 4 is formed as an etching-proof mask on the reverse or (as shown in the figures) lower surface of substrate 1. Membrane 4 is etched to pattern ink supply opening 5, using, e.g., a mixed solution of hydrofluoric acid and ammonium fluoride. Then, anisotropic etching is executed for the formation of ink supply opening 5. When this etching is

executed, not only depth etching but also side etching occurs, which may result in eaves (floating side portions) 8 of membrane 4 remaining in the structure. These eaves portions 8 of membrane 4 are removed by etching. Then, membrane 2 (at the location of the supply port) is removed by etching. (Col. 4, line 25 - col. 5, line 47; Figs. 1A-1G.)

As explained above, *Sato* shows only a single layer (membrane 4 as an etching-proof mask) formed on the surface of the substrate opposite that of the heat generating elements. In contrast, Claim 2 recites two layers (a protecting film and an etching-resistant film) formed on a surface of a substrate opposite from a surface on which an energy generating element is disposed.

Nothing in *Sato* is understood to teach or suggest a step of etching a surface of a protecting film by liquid containing ammonium fluoride to make the protecting film a thin film having a thickness of not less than 100 nm and not more than 500 nm, as recited in Claim 2.

Further, even if, for the sake of argument, ink supply opening 5 were deemed to correspond to Applicants' recited opening (supply port), nothing in *Sato* would be understood to teach or suggest a step of removing a projected end portion of a protecting film which is projected into an opening (supply port) and which is produced in an opening forming step, as recited in Claim 2.

Still further, even if, for the sake of argument, membrane 4 were deemed to correspond to Applicants' recited etching-resistant film, nothing in *Sato* would be understood to teach or suggest a step of removing an etching-resistant film after a projected end portion removing step (i.e., after a step of removing a projected end portion of a protecting film projected into an opening), as recited in Claim 2. This last-recited step of

Claim 2, i.e., the etching-resistant film removal step, specifically recites that, among two layers formed on a surface of a substrate opposite that of the energy generating element, a second layer portion is removed after a first layer portion is removed. As noted above, *Sato* most charitably construed could be deemed to teach only a single layer on such a surface of a substrate. *Sato* is not understood to suggest a step involving separate removal of two such layers, in a successive time sequence such as recited in Claim 2.

Since the documents cited in the Office Action, whether taken singly or in combination (even assuming, for the sake of argument, that such combination were permissible), do not teach or suggest all of the elements of independent Claim 2, that claim is believed allowable over those documents.

A review of the other art of record has failed to reveal anything which, in Applicants' opinion, would remedy the deficiencies of the art discussed above, as references against independent Claim 2. That claim is therefore believed patentable over the art of record.

The other claims in this application are each dependent from independent Claim 2 and are therefore believed patentable for the same reasons. Since each dependent claim is also deemed to define an additional aspect of the invention, however, the individual reconsideration of the patentability of each on its own merits is respectfully requested.

Applicants submit that this Amendment After Final Rejection clearly places the subject application in condition for allowance. This Amendment was not presented earlier, because Applicants believed that the prior Amendment placed the subject application in condition for allowance. Accordingly, entry of the instant Amendment, as an

earnest attempt to advance prosecution and reduce the number of issues, is requested under 37 C.F.R. § 1.116.

In view of the foregoing amendments and remarks, Applicants respectfully request favorable reconsideration and early passage to issue of the present application.

SECOND REQUEST FOR ACKNOWLEDGMENT OF RECEIPT OF CERTIFIED COPY OF PRIORITY DOCUMENT

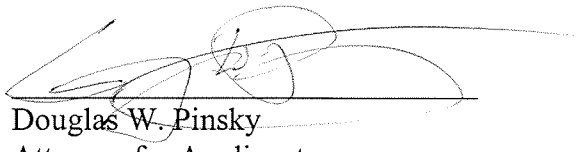
The Office Action dated May 24, 2006 acknowledged Applicants' claim for foreign priority but indicated that the certified copy of the priority document was not received.

However, Applicants submitted a certified copy of the priority document on July 9, 2004. Accordingly, acknowledgment of receipt of the certified copy of the priority document is respectfully requested.

The above request for acknowledgment was presented in the Request for Acknowledgment of Receipt of Certified Copy of Priority Document filed on October 11, 2006. However, no response thereto was received, nor was the requested acknowledgment provided in the Office Action dated November 16, 2006. Accordingly, the instant second request is made.

Applicants' undersigned attorney may be reached in our Washington, D.C. office by telephone at (202) 530-1010. All correspondence should continue to be directed to our below-listed address.

Respectfully submitted,



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